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## Participative Ecodesign: A New Paradigm for Professional Practice

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### Vector Module

Our problems with Tb in possums make this an essential element. However, it will be sufficiently generalised to support other vector problems, such as the arboviruses. It will contain fields for vector density (including absence) and disease status. Disease control managers will be able to record the dates and types of vector control operations. The results of operations will be assessed via linked surveillance module records.

### Special Modules

It is recognised that there will be requirements outside the generic modules described above. For example, with tuberculosis, a module to record lesion sites, pathology and microbiology is planned. Other conditions may also require special modules to be 'added on'.

### COMPUTER SYSTEMS

The NLD will operate on the MAF national network. This is a network of personal computers with supporting servers and other devices. The software system 'Oracle' will be used to develop the database, the so-called 'back-end'. The '4 GL Windows' product 'Power Builder' will be used to develop the input and output systems, the so-called 'front-end'. An additional analytical tool, for example 'SPSS', may also be necessary to provide for the requirements of regional and national disease control managers.

The configuration of databases, servers and work stations has yet to be defined. One certain challenge will be to achieve satisfactory speeds with such demanding software and systems in a network environment. However, there is no doubt that the efficiency and costs of computing systems will continue to improve dramatically, and we are therefore optimistic that any technology problems will be resolved.

### CONCLUSIONS

The livestock industries require information for trade and for better management in a tough world market. The information technology challenge is to keep up with the ever changing information requirements, as producers face an

array of opportunities and threats. Our aim with the NLD is to provide a sound basis to meet these needs in a timely and adequate manner.

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## PARTICIPATIVE ECODESIGN: A NEW PARADIGM FOR PROFESSIONAL PRACTICE

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".... every perception involves an aetiology and a prognosis" (Hanson 1969)

### INTRODUCTION

In the preparation of this text, I am reminded of the words of my colleague David Russell (1986): "...my real world is different than your real world and this must always be so. The common ground which is the basis of our ability to communicate with one another comes through the common processes of perceiving and conceptualising. The processes may be the same but the end products are never the same. What we share is communication of the worlds we experience, we do not share a common experiential world." With these words in mind, I invite you to critically reflect on your own professional practice and to consider the key experiences which have shaped your "view of the world". I hope to share some experiences which have helped shape my view of the world, and which might assist in your own critical reflection. I do so because late twentieth century science and the professional practices which derive from it, are under challenge by new discourses on "knowledge", "communication", "research", "development" and "learning". Because professional practice and the interpretation of individual experience is shaped by theories held "about the world", there is a need to consider these alternative discourses, and the implications for future education and practice.

### KEY EXPERIENCES

I wonder how often in your professional practice you have found that clients have not done what you think is good for the animal, or by implication, for themselves? How well have they carried out your "expert" advice?

My first experience of this occurred whilst still an undergraduate when my father, a grazier, was the recipient of my advice about pasture improvement.

Choice of species and method of establishment were not problematic, and were accomplished as per instructions. However pastures have a potentially long life in contrast to the period in which a young son is present or interested. In providing advice about species and sowing I was of course also envisioning, but not articulating, future states based on my theories of grazing management and factors governing pasture persistence. These were products of my experience but, of course, not of my fathers. My father was not satisfied with the outcome. I, of course, replied: "but you did not do x and then y"!

Later, in the early 1980's I was involved in a consultancy for FAO in Tanzania. I was part of a group running a training programme in tropical pasture science for east and west African pasture researchers.

As I had to undertake considerable preparation for the course, I spent a longer period in Tanzania, and was assisted in my preparations by being attached to a UNDP/FAO Livestock Development Project. The project was attempting to increase domestic beef production through development of a series of ranches on country allocated to the National Ranching Corporation. The project was staffed, in accordance with UN recruiting policies, with a range of professionals of varying nationality and background. A former beef rancher from South Dakota led the team, which also had a Dutch agricultural economist, livestock specialists from Poland and the Philippines, a retired professor of animal nutrition from Egypt, and Tanzanian counterparts with either agricultural or veterinary training, seconded from the Livestock Ministry, which was, and had been since colonial days, dominated by veterinarians with an "animal sickness" ethos.

1. Based on the work of French philosopher/historian Michel Foucault, Weedon (1987) explains discourses as: "...ways of constituting knowledge, together with the social practices, forms of subjectivity and power relations which inhere in such knowledge and the relations between them. They constitute the body, unconscious mind and emotional life of the subjects which they seek to govern."

One of the ranch developments was on an area of predominantly Miombo woodland, the habitat of the tsetse fly. Traditional grazing involved herdsmen, day grazing and night containment in a boma; this was accompanied by regular dipping. Part of the ranch was bounded by a perennial river and this factor, combined with project objectives of increasing beef output, had led to 150 ha of woodland adjacent to the river being cleared for the eventual sowing of irrigated, improved, tropical pasture.

When I visited the ranch, the timber had been cleared for about a year; considerable regrowth was already evident. The pasture had not been sown but the seed of legume and grass, imported from Australia, were in storage in a tin roofed shack on the ranch. It had been there for almost a year suggesting to me that the grass seed would no longer be viable. What I did find in place was a large self propelling irrigator, the pump, a New Holland hay baler and rake and a fertiliser spreader. The fertiliser spreader was for liquid manure - a type common in Europe or possibly on Australian dairy farms. All agreed it was unlikely to be of any use in the project. What had happened? All machinery procurement for FAO related projects was via headquarters in Rome. Need I say more! But the staff in FAO headquarters could not be held responsible for the decision by project staff that fodder conservation using this type of equipment was to be part of the "development strategy".

The machinery, lined up in the open - there was no machinery shed - was shown to me with pride and anticipation of what it might deliver. All this at a time when Tanzania had a chronic balance of payments problem such that petrol could only be purchased every other day, and the pilots of their international airline could only land at foreign airports if the landing fees had been prepaid. In other words there was no way beyond the life of the project that spare parts could be obtained for this sophisticated equipment.

Also, in my circles, the current wisdom was, and still is, that forage conservation in the tropics, particularly in the proposed form, was uneconomic.

On the return journey, we encountered elephant nearby. I inquired as to how they (the project team) proposed to keep these animals away from the sown and conserved pasture. Fencing was proposed, but they were clearly concerned and still thinking about this issue!

I must confess to not being innocent in all this. As a visiting "pasture expert" from Australia, I was quickly consulted as to sowing strategy for the seed in the shed. I had been in Tanzania all of 10 days. The short rains were about to start. Should they sow then or wait until the main rains. I was asked. Data available to me were limited, but average rainfall figures seemed to suggest it might be possible to sow in the short rains. But what was the quality of the seed and was there a high hard seed percentage to spread the risk of failure in the legume? These were unknowns. I suggested we needed these data to make a final decision. My understanding is that they proceeded to sow their precious seed in the short rains which were, I later learned, notoriously unreliable. To this day I do not know if a successful pasture was ever established, but I would not wager money on it.

How do I now interpret the many dimensions of these very formative experiences, and why are they relevant to this paper? My own reaction to this role of being the visiting "expert" were I think telling. I felt enormous pressure to "deliver the goods" or to provide the "facts" which might "solve" their dilemma. I did not then, as I would now, think of this as a "process issue" within a "systems problem". More of this later.

This experience, and my awareness that so much done in the name of "development" has failed, has led me, over twelve years of professional practice as an educator and researcher, to be concerned with the process of problem formulation.

Let me attempt to explain what I mean by this in the context of the Tanzanian story. To do this I need to ask you to think of how the project I described came into existence. Who might have been involved in naming the problem as

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low or unreliable beef supply for Dar es Salaam? How might FAO have become involved? Who might have represented them? Possibly a technical expert who saw the problem in a particular way and who may have proposed potential solutions based only on their own experience. These questions, based on similar experiences to mine, were asked by many development workers during the 1980's. This has lead to the emergence of qualitative methodologies, such as rapid rural appraisal, which value the perspectives of many of the people involved in a complex problem, when they are formulating what the "problem" is; and the Farmer First movement (Chambers and Thrupp 1989), which focuses on participation and local knowledge.

More importantly, however, I believe this story allows us to see that "problems" do not exist "out there" in "nature". Problems come into being, or are delineated, through the involvement of people, the way they use language to describe their world, and, by social processes through which agreement is reached about what constitutes a problem.

This for me was an important understanding, as it has lead me to raise questions such as:

- (1) What do we mean when we speak of knowledge?
- (2) What do we mean by research and development?
- (3) What is meant when we speak of learning?
- and, as a theme which weaves each of these together:
- (4) What do we mean when we speak of communication?

Asking these questions has put me in touch with what I can only describe as a "global questioning", or a major paradigm shift which is evident in all disciplines. In preparing this paper, it is interesting to see emerging in the literature a questioning of the prevailing veterinary science discourse, particularly by some with experiences beyond the context and country of their initial training (Tongyai and Wongnarkpet 1989; Morris 1989a; Young 1992; McCorkle and Mathias-Mundy 1992).

#### KNOWLEDGE

Can you imagine what the first project planning meeting might have

been like which brought all of the "actors" in the Tanzanian ranch project together?

By this stage the project would have already had a long history which would have shaped peoples' perceptions. Individuals were likely to have had different language skills, and indeed languages. For this reason some might choose not to speak. Others might speak and not be heard. Perceived and actual power differences between people in the project would further determine the nature of their interaction. It would be likely that each individual might pass through a range of emotional states which may or may not have been successfully interpreted from their body language and delivery of what they had to say. Slightly different interpretations of what a person said would be made by each member of the group.

We might also speak of each person bringing different "knowledge" to the group, knowledge formed in different cultural contexts. It might be said that some have local knowledge, others scientific knowledge and others practical knowledge.

What do we mean when we talk of knowledge in these ways? Let us examine this question in the light of Hansen (1969) and Russell's (1986) words above. Does each person bring to the meeting knowledge in the sense of some commodity or object, as is commonly inferred in contemporary usage? Perhaps you might concur and say: "Yes! He has these texts, and she has this decision support system there on her computer". I would disagree. What each brings to the meeting is their capacity to use language, in its broadest sense, in an attempt to share, through communication, their worlds of experience. It is in this process, or in our interaction with the text of a book or a VDU, or in our own critical reflection, that we attempt to create meaning or knowledge. From this perspective, knowledge is not divorced from the process and context of its creation. Creating knowledge or meaning in this sense is a singularly human act.

To develop this idea further, I would like to return to human perception, cognition and the

biological basis of human communication.

When Hansen says "Perception has an aetiology and a prognosis", it is likely that you will grasp the metaphor more readily than me, as "aetiology" and "prognosis" are usually outside my language domain (jargon?). Perception has a causal pathway and a forecasting element, or as I would prefer to put it, we see the world through perceptual filters which are our theories of the world. As Hansen states: "Both vision and knowledge are indispensable elements in seeing." This has a biological basis (Maturana and Varela 1987). As organisms, our nervous system is structurally closed to the external environment; biologically, it is not possible to inform another organism, or for information or knowledge to be transferred from one organism to another. Knowledge is socially constructed by people, and bounded by the context of their worlds; in this sense knowledge is a relational phenomenon, rather than an object (Maturana 1988). This return to our biology in understanding how we "know", brings into question many of the metaphors which shape how we currently think about communication and teaching.

#### HUMAN COMMUNICATION

There has been widespread criticism of the linear transfer of technology (TOT) model of agricultural R&D in which scientists are seen to create knowledge which is then taken up by advisers or extensionists, and passed onto farmers (Russell *et al* 1989; Ison and Ampt 1992; Jiggins 1993).

With respect to the client-consultant relationship, Morris (1979, p656) observes: "...we have in the past rather neglected his (farmer's) views, or at least have planned a course of action and then tacked on an 'extension' effort to convince the livestock owner that we are working in his best interest."

A pivotal conceptual framework embodied in the TOT paradigm is the diffusion and adoption of innovations model of technology transfer. With its associated language (eg. barriers to adoption, early adopters, laggards - see Ison 1993), it shapes how extension and advisory work is thought and talked

about, especially amongst administrators from a research background. For instance, Radostits and Blood (1985, p6) define what they considered a willing farmer: a leader, successful, stable, knowledgeable, risk averse, who operates within the limits of resources (land, cash, etc). This is almost equivalent to the "Innovator" in the diffusion of innovation model. It also reflects the tendency of professionals to orientate to clients who are most like them (Anderson 1984).

The diffusion model was developed in a particular context, and as so often seems to happen, educators, researchers and administrators have sought to employ it in contexts in which its assumptions no longer hold. This has been known for a long time (Crouch and Payne 1983; Latour 1987), yet still it shapes peoples' perceptions of extension. The TOT model has been shown to be based on a network of faulty assumptions, and powerful and embedded metaphors. They are linked to misconceptions about what actually occurs in the process of human communication (Russell 1992; Russell and Ison 1992; Ison 1993). The dominant metaphors are those of "information transfer", "information revolution", "channels of communication", and "teaching" (Ison 1990), most of which arise from seeing communication in the same way as two computers might transfer data. These pervasive metaphors based on the electronic model of communication of course ignore "meaning making" which is a singularly human ability with a biological basis.

As humans, we have no way of referring to ourselves, or to anything else, outside of language. Since language, or what we more commonly refer to as communication, creates what we call "reality", developing a shared meaning (a notion created by the observer) will involve participation in the task at hand of all those who will be affected by the outcome.

Based on his neurobiological research, Maturana (1988) has defined human social systems as 'systems of co-ordinations of actions in language, or networks of conversations'. He thus argues that a change in a human social system can only take place in the network of conversations that its members



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generate.

Using these ideas as a basis I would like to provide my interpretation of the "consultation and diagnosis process" as recently described to me by a vet colleague. I do so because I see this process as a conversation or to use Maturana's (1988) term, an act of "linguaging". My colleague indicated to me that the last thing he did in this process was to physically examine the animal. He described what I would call an exploration of context - historical and contemporary - in a process that is not unlike a performance. Of course, the client(s) and animal(s) are key participants in this conversation; (vets are remarkably adept at "knowing" an animal's body language and vocalisation). The veterinarian's sense data is filtered through his/her theories of the world. Only towards the end of the performance was the animal physically inspected, and thus engaged in a different form of linguaging (heart rates and sounds, swellings, pains, postures, biochemistry etc).

In recent research in the rangelands of western NSW, we have been very concerned with this idea of context. To date there has been a limited understanding of the relationship between Australian pastoralists and their environment - their context. In the sense we use it, an individual's context includes many "environments": their history of their land, the deeds and experiences of their people; their world of anticipated goals; as well as the environment of beliefs, values and mythology.

The same argument is now being mounted in medical and veterinary circles, where it is increasingly argued that the "patient - environment" or system level relationships are the level at which understanding and change are needed (Cunningham 1991; Morris 1989b). Morris (1989b) claims there has been: "too much emphasis on the technical aspects of diseases (especially of its agent in isolation, rather than adequately considering the context in which the disease occurs, ie environment or management factors)".

#### RESEARCH AND DEVELOPMENT

Russell and Ison (1992) have argued that much of what is done in science ignores its context; the case for a new R&D tradition which avoids being either objective or subjective - a science of relationships or second order R&D - is made.

This paradigm has its origins in hermeneutics (the study of interpretation), phenomenology (the philosophical examination of the foundations of experience and action), and neurobiology (which provides an intellectual framework in which phenomena of interpretation arise as a necessary consequence of the structure of biological beings).

These three intellectual streams have in common the questioning of our ability to objectify knowledge, and thus see objects and events independent of the very act of observation. The subject - object dichotomy, which separates knowledge from value, is seen by many as one of the failings of the current "scientific" world view (Appleyard 1992; Cobb, 1992).

My Tanzanian story demonstrates the difficulties we encounter when individuals with differing experiences and theories of the world come together to plan actions in novel contexts. Here I would also include the classroom. This problem is exacerbated when local people or students are excluded from the conversation, especially the process of project formulation, conduct and evaluation. As Russell Ackoff (1990) observed: "Development is primarily a learning process - one group cannot develop another. The only type of development possible is self development." This notion is beginning to be articulated by some veterinarians. Young (1992) working with village vet services observes that: "To achieve success, social and institutional work is at least as important as technical work. Veterinarians need to learn from the livestock keepers and to share their knowledge with them". This claim, whether overtly or covertly, addresses the crucial notion of power evident in relationships between knowledge, technologies and professional practice.

"Knowledge creation and dissemination or extension" has

traditionally been conceived as the function of agricultural and veterinary research and development. The consultant-client relationship relies on traditional discourses about what constitutes knowledge, and how it can be transferred to farmers. Thus, for many it is only a question of better packaging the facts or developing more effective "delivery" systems to get the "right" information to clients or students. These new discourses on knowledge necessitate a re-examination of what we commonly call or see as R&D, as well as teaching practice.

Research conducted in the NSW rangelands by the Community Approach to Rangelands Research (CARR) team exemplifies an attempt to respond to these new discourses (Russell and Ison 1992; Webber et al 1992ab). In our initial dialogue with pastoralists about developing new approaches to R&D, distinctions were made between:

- research on things, such as plants, soil etc;
- research on people and
- research with people.

Pastoralists found these distinctions meaningful. They were intrigued by our interest in researching with people, particularly as their previous experience of research and researchers was mainly one of researchers taking and seeming to give nothing back in return.

#### RELEVANCE TO VETERINARY PRACTICE

It is likely that the concepts I have explored above will resonate with members of the epidemiology chapter as you are concerned with "the ecology of diseases" or relationships between factors and diseases, rather than wanting to concentrate on symptoms of diseases.

My understanding is that veterinarians have traditionally been "clinical disease" orientated, but that there is increasing recognition that management and environment and other factors (sub-clinical and endemic diseases) can necessitate a broader or systems perspective. There is a broadening of the notion of disease in veterinary discourse to: "include not only clinical and sub-clinical disease but also management inefficiency, all three of which

can result in sub-optimal performance." (Radostits and Blood 1985,p4). Shallow (1992) speaking of consulting argues that: "The aim is to change the perception of farmers in our district towards veterinarians, from providers of only an 'ambulance service' to that of whole-farm consultants." Some non-traditional approaches have gone further, to consider links between farmers personal characteristics in relation to, for example, farm performance and mastitis (Tarabla and Dodd 1990). Epidemiologists have long seen disease in terms of the ecosystem, and as an imbalance in the ecosystem. This perspective considers "disease" in its environmental context (I include, here social factors) and as increasingly being concerned with relational properties in the system.

In practice it would appear that veterinary knowledge is valued over local or farmer knowledge, although Kevin Bell (1988 p29), who has a vet-farm management consultancy in WA, seems to come close to appreciating local knowledge, when he observes: "Be humble enough to accept the fact that most good ideas come from farmers...", and, "Facilitate information transfer: farmers learn best from other farmers (even better than from you)." In the context of the TOT model outlined above, these are mixed messages when later, Bell (p31) states that the priority for consultants is to "transfer knowledge". Blood and Brightling (1988, p viii) also refer to "the knowledge explosion" which in my terms would be more accurately described as a data explosion, as only when meaning, by humans, is given to data is information produced. These conceptions are cause for concern given the increasing belief that decision support systems can "participate in decision making" (ibid p92; see Ison 1993).

It could be argued that R&D, because of its reliance on "professional expertise" is a "values imposing system". Conventionally, despite all recent evidence to the contrary (see Latour, 1987; Appleyard 1992), scientific understanding is seen as objectively determined and value free. These understandings thus have the "power of truths" and accusations are then made against



traditionally been conceived as the function of agricultural and veterinary research and development. The consultant-client relationship relies on traditional discourses about what constitutes knowledge, and how it can be transferred to farmers. Thus, for many it is only a question of better packaging the facts or developing more effective "delivery" systems to get the "right" information to clients or students. These new discourses on knowledge necessitate a re-examination of what we commonly call or see as R&D, as well as teaching practice.

Research conducted in the NSW rangelands by the Community Approach to Rangelands Research (CARR) team exemplifies an attempt to respond to these new discourses (Russell and Ison 1992; Webber et al 1992ab). In our initial dialogue with pastoralists about developing new approaches to R&D, distinctions were made between:

- research on things, such as plants, soil etc;
- research on people and
- research with people.

Pastoralists found these distinctions meaningful. They were intrigued by our interest in researching with people, particularly as their previous experience of research and researchers was mainly one of researchers taking and seeming to give nothing back in return.

#### RELEVANCE TO VETERINARY PRACTICE

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those who are not prepared to "see" these truths and change their behaviours by adopting different practices. As an example, Radostits and Blood (1985, p8) outline their "methods" in a table with the caption "Converting farmers to a herd health service". They describe three steps: 1 "Develop farmer's psychological dependence on your advice" (demonstrate your skills and advice...); 2 "Motivate farmer to start a herd health program", and 3 "Stimulate farmer to keep the program going."

These approaches are not consistent with my experience, and I would like to suggest an alternative framework for some aspects of future professional practice.

#### PARTICIPATIVE ECODSIGN

Despite the growing body of world-wide experience to the contrary, there persists the view that one person or nation can change or develop the other - to be responsible for them. It seems too easy to fall into the old cliches which imply "we know what is right" and "others need to change their behaviours" and that we can effect these changed behaviours if we can "get inside their heads to understand what makes them tick" or if we can "deliver the message more effectively". These cliches and metaphors have the effect of setting ourselves, the experts and scientists, up as if students or our clients were marionettes requiring skilful manipulation. It is too easy to think that there are short-cuts and that local constraints and contexts can be by-passed. I must emphasise that I am not questioning the utility and desirability of "expertise" but calling for greater consideration of, and alternative contexts for, its practice. So how can we move away from action based on the cliches and embedded metaphors?

Maturana (1988) recognised two ways to trigger change in human social systems; both require experiences outside the network of conversations that constitutes any particular human social system:

- through encountering others in a network of conversations that are not confirming, as when encountering foreigners or when moving beyond the normal ranges of a community

- through interactions that trigger in us reflections upon our circumstances of coexistence with other human being: common, in my experience, in relationship, in which 'love' is seen to be involved.

Drawing on this conceptual framework, our CARR group has been working over the last two years to assist a small group of pastoralists research an issue they have nominated as being of concern: marketing of middle micron wool. One of the major outcomes of this research has been a set of process design principles, which we believe have some general utility for the design of participative R&D.

Some guiding design principles for participative research in the rangelands

- \* Projects have the potential for more mutually satisfying outcomes when an invitation is extended to participate, and the resultant communication is based on conversations which acknowledge each person's experience as unique and valid;
- \* it is important to understand that experience and knowledge is related to context, and that it is necessary to attempt to appreciate particular contexts;
- \* enthusiasm, which may be triggered, appears to be an emotional state predisposing individuals to action which is meaningful to that individual;
- \* matters individuals are keen to take action on may or may not concur with "experts" or institutional priorities;
- \* pursuit of these matters in open, collaborative and critically informed ways can lead to locally meaningful and adaptive changes;
- \* knowledge is both individually and socially constructed and because of this, processes are necessary to create learning networks;
- \* pastoralist families and communities already do "research" and "extension" (share experience and knowledge - but they place importance on

waiting to be asked);

- \* diversity of experience, knowledge, research and "extension" action is an asset of equal importance to the diversity of the biophysical environment.

These two last possibilities provide a framework for what I am calling **ecodesign**.

Design can be characterised as an involvement in a project that has many players and that translates human culture, technology and aspiration into form (Coyne and Snodgrass 1991). My focus on design is in response to Hooker's (1991) observation that: *"The direct consequence of the profound changes in the character and role of organised knowledge is that the future must now be regarded as increasingly a human artefact - an art-in-fact. The future can no longer be regarded as a natural object, a fact already there or objectively determined by present trends. Rather it must be chosen."*

Artefacts are the realisation of human value judgements in facts, in the concrete design of our world. Artefacts are experiments, experiments first with what is possible, and then what is preferable. They are designs, chosen from among possible designs, because of the values they realise in the designs." He proposes a process of futures design based on "backcasting" rather than extrapolation or projection from the present. (See Ison 1993).

Ecodesign is specifically concerned with bringing ecological principals and values (see Russell 1991; Walters and Holling 1990) to bear on the design process. Future professional roles are thus likely to involve responding to and extending invitations for problem or opportunity formulation as members of co-researching teams, joint identification and evaluation of alternatives, designing and facilitating group processes, and co-managing and evaluation of plans and programs.

Appropriate values for design must be articulated and developed. What are some of these possible values? I do not wish to be prescriptive, but I invite you to consider one perspective in the design of your future practice as veterinarians and educators.

John Heron (1989) developed a model which identified three levels of power to be consciously recognised in the process of project or learning activity (eg. curriculum) design: (i) Hierarchical, with "power over" leading to "deciding for"; (ii) Cooperative, or "power with" leading to "deciding with" and (iii) Autonomous, or "power to" leading to "delegating deciding to". Whilst not consciously using Heron's model, it nonetheless encompasses principles which have guided the design of our CARR project. I invite you to consider these in the design of curricula, and in the development of co-researching or co-learning networks with your clients. The distinction between authoritative and authoritarian is important here. An educator or professional may have more experience and theoretical development in some domains. This clearly provides authority just as the farmer is an authority on his/her own context. The invitation is to value each others authority and to resist transforming authority into authoritarianism (Friere and Shor 1987).

Participative ecodesign is proposed as a new paradigm which might shape future professional practice in ways that change the nature and quality of relationships between "experts", clients and technology.

#### ACKNOWLEDGMENTS

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